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3D PPM Simulations of Turbulence-Shock interactions in Compressible Fluids* R. H. COHEN, W. P. DANNEVIK, A. M. DIMITS, D. E. ELIASON, A. A. MIRIN, O. SCHILLING, *Lawrence Livermore National Laboratory*, D. H. PORTER, P. R. WOODWARD, *University of Minnesota* — We report the results of 3D piecewise-parabolic-method (PPM) compressible-fluid simulations of the interaction of pre-existing homogeneous turbulence with the passage of a strong shock. We perform three classes of simulations, one approximating closed-ended shock-tube experiments and the other two approximating passage of a shock through an unbounded medium, and for each, follow the turbulence statistics as functions of space and time as the shock moves across the simulation domain. We report investigations of (1) amplitude enhancement and anisotropies introduced by the shock passage, and their dependence on shock amplitude and the statistics of the pre-existing turbulence; (2) the difference in results from the different classes of simulations; and (3) relationships between terms that arise in the evolution equations for averages of various products of the fluctuating fields. The motivation for the latter is to suggest and test closure relations for use in subgrid models.
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